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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/997,142	11/29/2001	Xiaoliu Liu	01-733	3417

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EXAMINER	
EDGAR, RICHARD A	
ART UNIT	**PAPER NUMBER**
3745	12

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/997,142	LIU, XIAOLIU	
	Examiner	Art Unit	
	Richard Edgar	3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *an RCE filed 21 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Arguments

Applicant's arguments filed January 21, 2004 have been fully considered but they are not persuasive.

Applicant has presented three primary arguments.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation is found in the knowledge generally available to one of ordinary skill in the art. Turbine shafts are supported by multiple bearings and such bearings are capable of each having the seals taught by Tran et al.

Applicant further argues that the Tran et al. hydropad seal is to be used only in locations where oil leakage into an air chamber is to be avoided, such as air bleed into an aircraft cabin. The duplication of the Tran et al. seals for other bearing locations, Applicant argues, is economically disadvantageous, adds weight, and is less reliable.

A review of claims 1-7 of U.S. Patent No. 6,142,729 shows that Tran et al. does not limit the hydropad seals to specific bearings, other than a bearing chamber in a

turbomachine. Furthermore, the argument presented by Applicant on page 8 of the remarks, lines 11-13, is but an "example" and the invention of Tran et al. is not to be limited by this "example". Applicant also states that the hydropad seals are more expensive than "other types of seals". The examiner does not know what "other types of seals" includes. There is no economic analysis of hydropad seals vs. "other seals" in the original disclosure, including the claims. The phrase "more expensive" than other seals implies that hydropad seals are not the most expensive seals. Applicant states the hydropad seals are heavier than "other types of seals". Again the examiner does not know what "other types of seals" includes. There is no mass analysis of the seals in the original disclosure, including the claims. The phrase "heavier" than other types of seals implies that hydropad seals are not the heaviest seals. Applicant states the hydropad seals are less reliable than "other types of seals". Again, the examiner does not know what "other types of seals" includes. There is no life analysis of seals in the original disclosure, including the claims. The phrase "less reliable" than other types of seals implies that hydropad seals are not the least reliable seals. Therefore, Tran et al. use a hydropad seals, which are less expensive, lighter and more reliable than other types of seals, which are advantages.

Applicant says on page 8 that Tran et al. "recommend use of their respective devices only where the taught benefits are available". This is not agreed with by the examiner. While it is true that Tran et al. recite specific embodiments, the invention is not limited by these locations. In fact, Tran et al. are suggesting locations where it may be beneficial to place these seals, while one having ordinary skill in the art would be

reasonably capable of modifying these locations to other bearing housings along the rotating shaft, as is accomplished with the teachings of Smith (U.S. 4,531,358). Additionally, it is noted that Tran et al. do not recite specific bearing locations in any of the patented claims, and Applicants claims merely recite a plurality of bearings in pending claims 1-15.

Accordingly, it is submitted that the examiner has presented a prima facie case of obviousness since (a) it has been shown that the cost, weight and reliability of hydropad seals are advantageous than "other seals", and (b) Tran et al. merely suggest certain locations as examples for using the seals, and other locations are suitable for use.

Applicant's second main argument is based upon the environment in which the seal is placed. The arguments span pages 11 through 13 of the Remarks.

Applicant's claims as well as the disclosure have been carefully reviewed by the examiner and there is no specific recitation of the seal being arranged with a positive, negative or zero pressure differential, as is argued. Applicant's arguments have no support in the original disclosure, and is evidenced by such fact since Applicant has not amended the claim to recite such a limitation or pointed to a specific limitation previously in the claim which supports such an argument. Applicants argue that the seal placement within the engine is an aspect of what is claimed to be novel, but strangely, Applicant does not claim this alleged novel feature. It appears Applicant has not claimed the subject matter which he regards as his invention as is required under 35 U.S.C. 112, 2nd paragraph, quoted below:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Since Applicant has not claimed a seal used in a neutral- or negative-pressure environment, the examiner need not provide a prima facie case of obviousness for such a limitation.

Applicant lastly argues that claims 2, 7, 13 and 15 specifically recite the absence of an oil-air separator, while Tran et al. specifically recite such an element, therefore the 103(a) rejection is improper. This is not agreed with since Tran et al. do not require such an oil-air separator in the claims. While it is true that Tran et al. disclose an oil-air separator, this is merely a suggestion, and the turbine engine and seal assembly, as understood by those having ordinary skill in the art, is perfectly capable of working without the use of such a separator. Such operation may require an increase in oil use.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 6,142,729 issued to Tran et al. (Tran et al. hereinafter) in view of United States Patent No. 4,531,358 issued to Smith (Smith hereinafter).

Tran et al. teach a method of minimizing oil consumption in a gas turbine engine by providing a seal between an air chamber 6 and a bearing (oil) chamber 5. A rolling

bearing 3 is housed in the bearing chamber 5, wherein the bearing 3 supports a turbine shaft 1. The seal between the air chamber 6 and the bearing chamber 5 comprises a static carbon ring 7 associated with a rotary ring 8. The static carbon ring 7 is held in a fixed annular support 14. The rotary ring 8 is fixed by way of pins 10 to a sleeve 4 which is in turn fixed to the rotary shaft 1. Therefore, the rotary ring 8 rotates with the turbine shaft 1 as the static carbon ring 7 is fixed stationary relative to the rotating turbine shaft 1. The static carbon ring 7 abuts against the rotary ring 8. Below a lift-off speed, the static carbon ring 7 frictionally engages the rotary ring 8 due to a force exerted on the static carbon ring 7 by the associated spring 21. The rotary ring 8 is provided with lift grooves 18 (see Fig. 4) in the surface so that no appreciable friction is generated between the sealing surfaces of the static carbon ring 7 and the rotary ring 8.

Tran et al. limit their written disclosure to one bearing chamber in a turbomachine, therefore Tran et al. do not explicitly teach a plurality of bearing chambers in a turbomachine.

Smith shows in Fig. 1 a turbine having a low pressure shaft 7 arranged between the low pressure compressor or fan, and the low pressure turbine, and a high pressure shaft 8 arranged between the high pressure compressor and the high pressure turbine. Such an arrangement is conventional in turbine engines. The shafts 7, 8 are supported by bearings 9, 10, 11, 12, 13, housed in a plurality of bearing chambers 15, 16, 17. Now referring to Fig. 2 of Smith, a diagrammatic illustration of the bearing oil circuit is shown. Only one bearing chamber 15 is shown, however, the teaching is applicable to each bearing chamber 15, 16, 17. The bearing chamber 15 is arranged with an oil

supply 23 and an oil scavenge pump 25 in communication with a bearing chamber outlet 24 on the bearing chamber outer periphery. Smith's oil circulating system enables oil to be circulated through every bearing chamber along each rotary shaft in the turbine engine for the purpose of lubricating all of the bearings.

Since Tran et al. teach a specific seal used in a bearing chamber of a gas turbine engine and Smith shows that there is conventionally more than one bearing chamber in a gas turbine engine, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to duplicate the seal teaching of Tran et al. which is shown in only one bearing chamber of a turbine engine, to include every bearing chamber in a turbine engine, since more than one bearing chamber is commonly used in turbine engines as shown by Smith, to have a plurality of bearing chambers each having the sealing arrangement shown by Tran et al. for the purpose of lubricating all of the bearings located along the turbine shaft(s) in a turbine engine.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Edgar whose telephone number is (703) 305-0050. The examiner can normally be reached on Monday-Thursday 6:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look can be reached on (703) 308-1044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Richard Edgar
Examiner
Art Unit 3745

RE

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2/3/04